Course guide
370012 - INSTRUMOPT - Optometrics Instruments

Last modified: 01/04/2025

Unit in charge: Terrassa School of Optics and Optometry
Teaching unit: 731 - OO - Department of Optics and Optometry.

Degree: BACHELOR'S DEGREE IN OPTICS AND OPTOMETRY (Syllabus 2020). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Núria Tomas Corominas, TU
(http://futur.upc.edu/NuriaTomasCorominas

Others:

PRIOR SKILLS

Have solid knowledge of Geometric Optics, Instrumental Optics and Visual Optics.
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REQUIREMENTS

Having studied geometric optics, photometry and instruments and visual optics

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE04. (ENG) The ability to understand the process of image formation and the properties of optical systems. The ability to understand aberrations in optical systems. The ability to understand radiometric and photometric fundamentals and laws.
CE07. (ENG) The ability to understand and manage basic laboratory materials and techniques.
CE09. (ENG) The ability to understand the principles, descriptions and characteristics of basic optical instruments and the instruments used in optometric and ophthalmic practice.
CE22. (ENG) Conèxier i aplicar ajudes òptiques i no òptiques per a la baixa visió.

Generical:
CG5. Give opinions and produce reports and expert reports when necessary.
CG6. Assess and incorporate the technological improvements necessary to properly carry out professional activities.

CG8. Plan and carry out research projects that contribute to the production of knowledge in the field of optometry and disseminate this scientific knowledge via the typical communication channels.
CG9. Expand and update one’s professional abilities through continuing education.

Transversal:
CT7. Foreign language. Demonstrate knowledge of a foreign language, preferably English, at an oral and written level that is consistent with graduates' future needs.

CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

TEACHING METHODOLOGY

MD1 - Participatory lecture class of theoretical and practical content
MD2 - Active methodologies in the classroom (project-based learning (PBL), case studies, role-playing games, cooperative learning, ...)
MD3 - Practical class of resolution, with the participation of the students, of practical cases and / or exercises related to the contents of the subject
MD4 - Laboratory practices

LEARNING OBJECTIVES OF THE SUBJECT

Objectiu: TO get knowledge about fundamental optical and optometric instruments

STUDY LOAD

Type	Hours	Percentage
Hours medium group	45,0	30.00
Hours small group	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

1.- INTRODUCTION TO OPTOMETRIC INSTRUMENTS

Description:
Fundamental concepts
General characteristics of optical instruments

Specific objectives:
Review of general concepts and fundamental characteristics of basic instruments, as well as geometric optics tools that are the basis for understanding the most common optometric instruments

Related activities:
Problem sessions.

Full-or-part-time: 10h
Practical classes: 2h
Laboratory classes: 2h
Self study : 6h

2. INSTRUMENTATION FOR LOW VISION

Description:
Introduction to low vision
Instrumentation for distant vision: Galileo and Kepler eyepiece adapted to low vision
Instrumentation for close vision: Loupe and Telemicroscope

Specific objectives:
Know the basic optical instrumentation used in low vision
Knowing how to calculate the most relevant parameters of the instruments (magnification, field, clarity and resolution) for good use in low vision environments. Distinguish its characteristics and for the most appropriate uses

Related activities:
Problem sessions.
Laboratory sessions
Search for commercial and scientific information on optometric instruments

Full-or-part-time: 40h
Practical classes: 6h
Laboratory classes: 10h
Self study : 24h

3 INSTRUMENTATION FOR COMPENSATING ELEMENTS

Description:
focimeter
Automatic focimeter

Specific objectives:
Get to know the basic instrument used to measure the parameters of ophthalmic lenses: the focimeter
Understand how these measurements are made, emphasizing the sources of error

Related activities:
Problem sessions.
Laboratory sessions
Search for commercial and scientific information on optometric instruments

Full-or-part-time: 15h
Practical classes: 2h
Laboratory classes: 4h
Self study : 9h

4 INSTRUMENTATION FOR THE STUDY OF OCULAR STRUCTURES

Description:
Ophthalmoscope and direct and indirect ophthalmoscopy
retinographer
Retina Analyzers (OCT)
Other fundus observation techniques
Ocular biomicroscope

Specific objectives:
Know the basic optical instrumentation used to observe the ocular structures: anterior segment and retina
Understand the composition, operation and main characteristics of a biomicroscope, both the observation system and the lighting system
Understand the basic techniques of ophthalmoscopy and their applications in different instruments.
Understand the basics of advanced retinal analysis and observation techniques (OCT)

Related activities:
Problem sessions.
Laboratory sessions
Search for commercial and scientific information on optometric instruments

Full-or-part-time: 52h 30m
Practical classes: 13h
Laboratory classes: 8h
Self study : 31h 30m

5 INSTRUMENTATION FOR EYE MEASUREMENTS

Description:
keratometer
Corneal topographers as analyzers of the anterior segment

Specific objectives:
Know the different instruments used to measure corneal parameters, mainly the keratometer and the different types of topographers
Understand how different corneal measurements are captured and how corneal maps are made and what the differences are between them

Related activities:
Laboratory sessions
Search for commercial and scientific information on optometric instruments

Full-or-part-time: 22h 30m
Practical classes: 5h
Laboratory classes: 4h
Self study : 13h 30m

6 INSTRUMENTATION FOR THE DETERMINATION OF THE REFRACTIVE STATE OF THE EYE

Description:
Retinoscope and retinoscopy
Automatic refractometers

Specific objectives:
Know both the composition of the instrument and its operation
Understand why the different movements occur when doing retinoscopy, linked to the patient's ametropia
Introduction to autorefractometers, conditions of use and comparison between the different instruments for determining the refractive state of the eye

Related activities:
Search for commercial and scientific information on optometric instruments

Full-or-part-time: 10h
Practical classes: 2h
Laboratory classes: 2h
Self study : 6h

ACTIVITIES

1.- LABORATORY PRACTICES

Description:
Optical bench construction of some studied optometric instruments, analysis of their characteristics, properties and benefits.
The practice sessions are held in the Optometric Instruments laboratory in the TR8 building.
The development of a practice session is in pairs, with a duration of 2 hours.
Before the start of the practice session, an activity preparation sheet must be handed in with a short report of the instrument that will be simulated in the laboratory that will be evaluated
At the end of the practice, a summary of results sheet containing the results obtained must be given.
The evaluation is done through two test-type tests, one in the middle of the semester and the other at the end of the semester.

Specific objectives:
Encourage the study of the basic concepts of each instrument through prior preparation of the practice.
To help understand the composition, operating system and characteristics of optometric instruments and associated techniques.
Foster the ability to synthesize through summaries and enhance group work.

Material:
Available at Athena
Detailed script with the general objectives, material used, specific objectives and development of the practice
Results summary sheet.
Activity preparation sheet
The instruments laboratory has all the necessary material for carrying out all the practices.

Delivery:
Before starting the session, the students must hand in a practical preparation sheet, which highlights their previous knowledge of the instrument. This worksheet is cross-corrective, that is, each student corrects the one of a randomly chosen classmate.
At the end of each session, each student must hand in the summary of results corresponding to the practice done in the laboratory. This sheet will be returned to the student at the time of the practical assessment for use during the assessment.

Full-or-part-time: 50h
Laboratory classes: 50h

name english

Full-or-part-time: 25h
Self study: 15h
Laboratory classes: 10h

name english

Full-or-part-time: 10h
Self study: 6h
Laboratory classes: 4h

EUROPEAN DIPLOMA IN OPTOMETRY COMPETENCES

Description:
This module contributes to the European Diploma in Optometry competencies indicated in the following link:
https://drive.google.com/drive/folders/1bwmHBsvkrGnY63DfXAnWZB_i0I2pXa-I?usp=drive_link

Full-or-part-time: 1h
Guided activities: 1h

GRADING SYSTEM

The final grade (QF) is the sum of the following partial grades:
QF=TiP1*0.3+ TiP2 *0.3+ PR1*0.11+PR2*0.11+ PP*0.03+ IC*0.15
TiP1: First Partial Exam (theory and problems) (30%). Exam short questions and problems
TiP2: Second Partial Exam (theory and problems) (30%). Exam short questions and problems
PR1: First practice exam (11%) Test-type exam
PR2: Second practice exam (11%) Test-type exam
PP: Practice preparation sheet (3%)
IC: Work on Commercial Instruments (15%) delivered at the end of the course. Evaluation of CT2

CT evaluation
CT2- Sostenibilidad y Compromiso Social.: in the IC work (commercial instruments,) must include a reflection section on the sustainability of the instrument considering consumption, the waste it can generate, how to treat this waste, the equal opportunities in the environment of the use of the instrument. Not including this section will penalize the grade by 10%
CT6- Independent Learning will be assessed through the delivery of the practice preparation sheet (PP)

CT7- Third language. In the IC work, a summary in a third language will be requested. Not including this section will penalize the grade by 10%

Evaluation of the competences of the DE

1 Geometrical Optics Knowledge 10 ophthalmic and optical instruments is worked on throughout the subject, therefore the evaluation of this competence is transversal to the entire subject

Re-evaluation: in case of re-evaluation, there will be a written examination of theory and problems with a value of 100%

EXAMINATION RULES.

It is necessary to attend 100% of practices”
It is necessary to attend 80% of practical case and problem sessions
A form is available for all assessment tests, which will be delivered together with the assessment test

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Complementary:
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- Martínez Corral, M. [et al.]. Instrumentos ópticos y optométricos: teoría y prácticas. València: Universitat de València, 1998. ISBN 8437034906.
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